Allergic Rhinitis- Who, Why, When, Where, How!

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Division of Allergy and immunology

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Akron Children's Hospital

Disclosures

- I have nothing to disclose.

Objectives

- Review and discuss how to manage allergic rhinitis and conjunctivitis.
- Discuss common benefits and concerns for nasal steroids.
- To discuss and decide about nasal antihistamine use in clinical practice.
- Review doses and use of antiallergy medications for AR, AC.
- Decide between the best antihistamine for use in general clinical practice.

Who? Gets allergies

- 10-30% of kids and adults.[1]
- 1 year old - indoor
- Starts at 2-3 for outdoor allergens
- Worsens with age
- Boys>girls
- Other atopic disease, Family history of allergies

What?

- Sneezing

CDC Public Health Image Library

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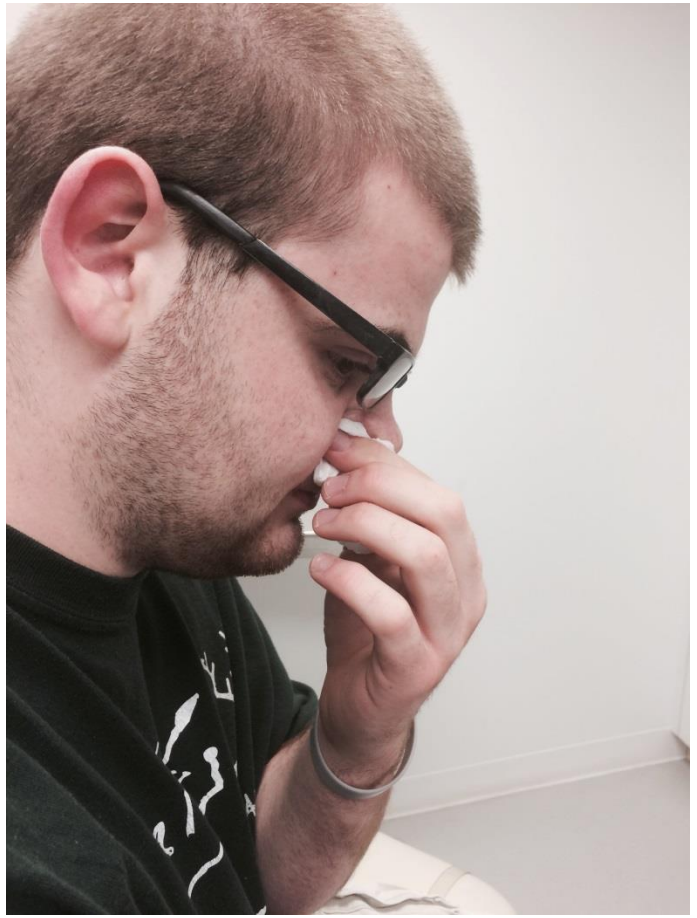
What?

- Sneezing
- Itching

What?

- Sneezing
- Itching
- Rhinorrhea (Dripping)



What?

- Sneezing
- Itching
- Rhinorrhea
- Congestion

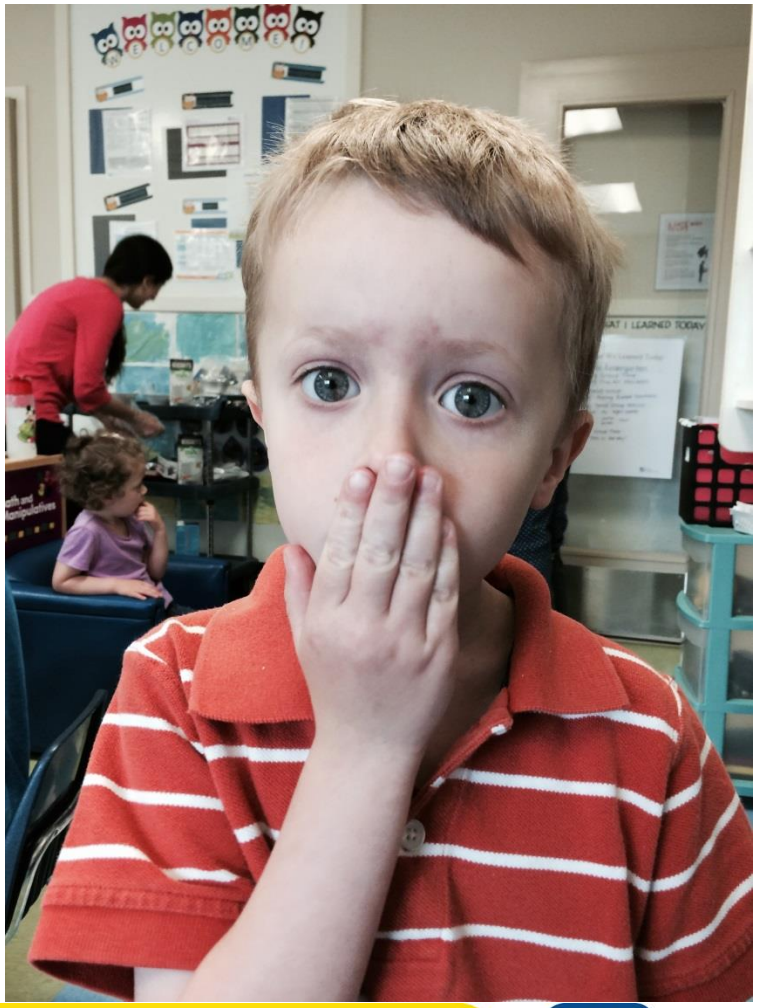
Source: Wikimedia Commons

What else?

- Throat itching
- Clearing the throat
  - Cough
  - Vocal Cord Dysfunction-teens especially

What else?

- Throat itching
- Clearing the throat
- Allergic salute



What else?

- Throat itching
- Clearing the throat
- Allergic salute
- Allergic shiners

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What else?

- Throat itching
- Clearing the throat
- Allergic salute
- Allergic shiners
- Mouth breathing

What else?

- Throat itching
- Clearing the throat
- Allergic salute
- Allergic shiners
- Mouth breathing
- Faceache (NOT HEADACHE)

What, there's more?

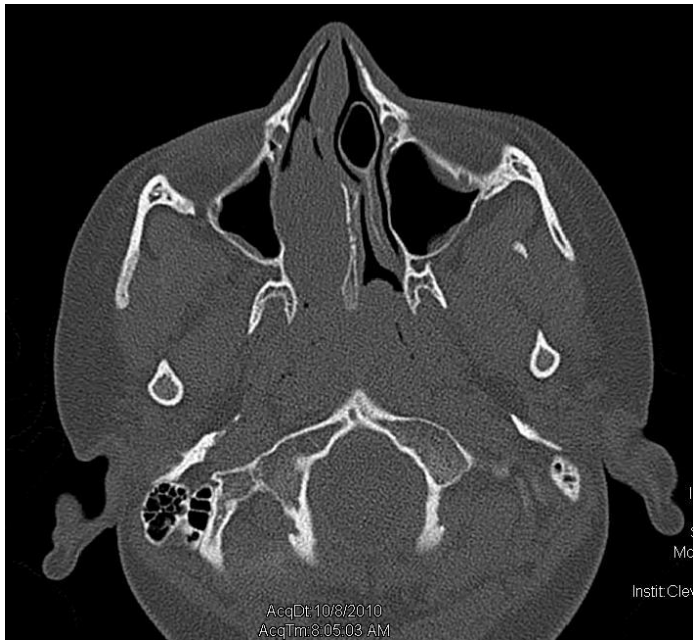
- Presenteeism
- AOM?
- Trouble falling asleep
- Sleep Apnea

What comes with it?

- Non-allergic rhinitis- >40% adults have mixed rhinitis.[2]
- Allergic conjunctivitis
- Asthma
- Eczema
- Food allergies

What it isn't? DDx

- Frequent colds- 3-8 per year- often purulent mucous
- Chronic Sinusitis
- Enlarged Adenoids
- Non-allergic rhinitis
- Nasal polyps
- Cystic Fibrosis- see above
- Primary ciliary dyskinesia.
- Anatomic obstruction- Concha Bullosa, etc.



What it looks like?

- Physical exam of nose- nonspecific
- Allergic shiners- 38% nonallergic[3]
- Mouthbreathing- Any nasal obstruction.

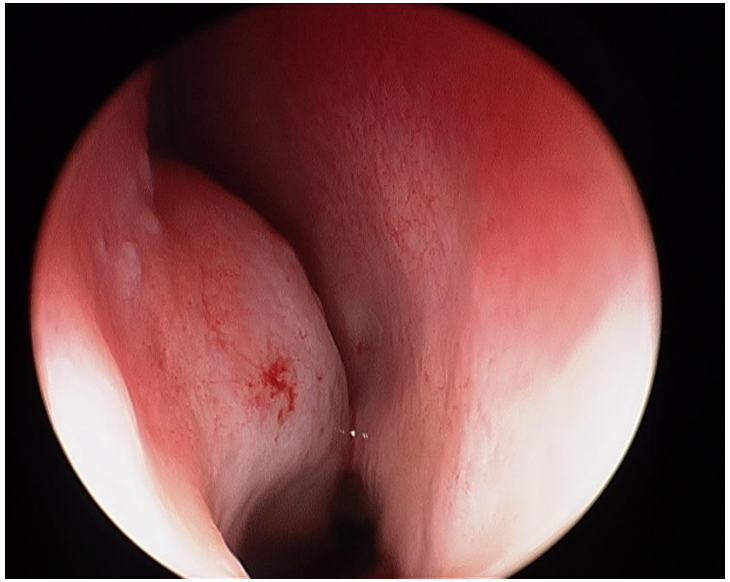


Photo Courtesy of Dr. Micheal Benninger, MD Cleveland Clinic

What it looks like to me?

What it looks like to me?

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What causes it?

What causes it-blood testing?

- Immunocap – Specific IgE: 90% sensitive vs SPT.
- In adults- 24% of allergy testing negative patients became positive when test repeated in 3 years.[4]

Why-Indoor Aeroallergens?

- Animals- Cat, dog, any feathers or fur
- Dust mites
- Cockroaches
- Pests- mice/rats
- Mold

Why-Indoor Aeroallergens?

- Animals- Cat, dog, any feathers or fur
  - Very light, suspends in air
  - Ubiquitous
  - Nose and lungs by inhalation
  - Eyes by contact
  - THERE ARE NO HYPOALLERGENIC DOGS OR CATS!
- Dust mites
- Cockroaches
- Pests- mice/rats

Why-Indoor Aeroallergens?

- Animals- Cat, dog, any feathers or fur
- Dust mites/Cockroaches
  - Very heavy- needs to be disturbed to get in air.
  - Nose and lungs by inhalation
  - No eye symptoms
  - Not filtered by HEPA filters
- Pests- mice/rats
- Mold

Why-Indoor Aeroallergens?

- Animals- Cat, dog, any feathers or fur
- Dust mites
- Cockroaches
- Pests- mice/rats
  - Urine aerosolized when dry
  - SPT and serum maybe false negative.
- Mold

Why-Indoor Aeroallergens?

- Animals- Cat, dog, any feathers or fur
- Dust mites
- Cockroaches
- Pests- mice/rats
- Mold-
  - Indoor mold spore levels mostly determined by outdoor levels
  - If water damage in home- maybe mold
  - If mold in home- maybe rhinitis, or asthma

Picture: Alternaria- Public Domain- CDC/Dr. Lucille K. Georg Creation Date: 1955

Why-Outdoor Aeroallergens?

- Molds
- Pollens

William Crochot - Source and public domain notice at Dartmouth Electron Microscope Facility

Why-Outdoor Aeroallergens?

- Pollens- Male plant genetic material
  - 5-80 mcg in size.
  - Wind pollinated plants- NOT PRETTY FLOWERS

When- does it occur? Indoors

- Dog, cat, dust mites, cockroach, rodents
  - Year round
- Mold- if water damage
- Thanksgiving syndrome

When does it occur? Outdoors

- Tree pollen- early spring.
  - March through May
- Grass pollen- late spring, early summer.
  - May-July 4th.
- Molds- when warm and humid spring through late fall.
- Weed pollen- late summer until “first frost”
  - Mid August- early October.

Where- does it occur?

- Outdoors- Depends on where you live.
- Indoors-
  - Animal dander is everywhere
  - Dust mites- dust, carpet, upholstered furniture, bedding.

How to treat? #1 Treatment: Avoidance

- Difficult- little evidence for recommendations

How to treat? Avoidance

- Difficult- little evidence for recommendations
- Cat/dog- Practice parameters: Furry animals[5]
  - Impossible to avoid if in house
  - If the cat or dog is removed and house intensively cleaned- it takes 20 weeks![6]
  - If cat/dog washed- removed allergen… for 1 day?
  - Hypoallergenic covers may help- need to be washed once per year.

How to treat? Avoidance

- Dust mites- Practice parameter 2013[7]
  - Studies on Dust mite or “hypoallergenic covers” mixed.
  - Worth a try- one time cost
  - Need to wash linens in hot water.
  - HEPA filter vacuum
- Duct Cleaning not helpful for any allergen.

How to treat? Avoidance

- Outdoor allergens-
  - Close windows
  - HEPA Filter in HVAC- Use it!
  - Shower after being outside
  - Mow your own lawn- don’t get the kid to do it!

How to treat?
2020 Practice Parameters- Its complicated

Practice parameter

Rhinitis 2020: A practice parameter update

Check for updates

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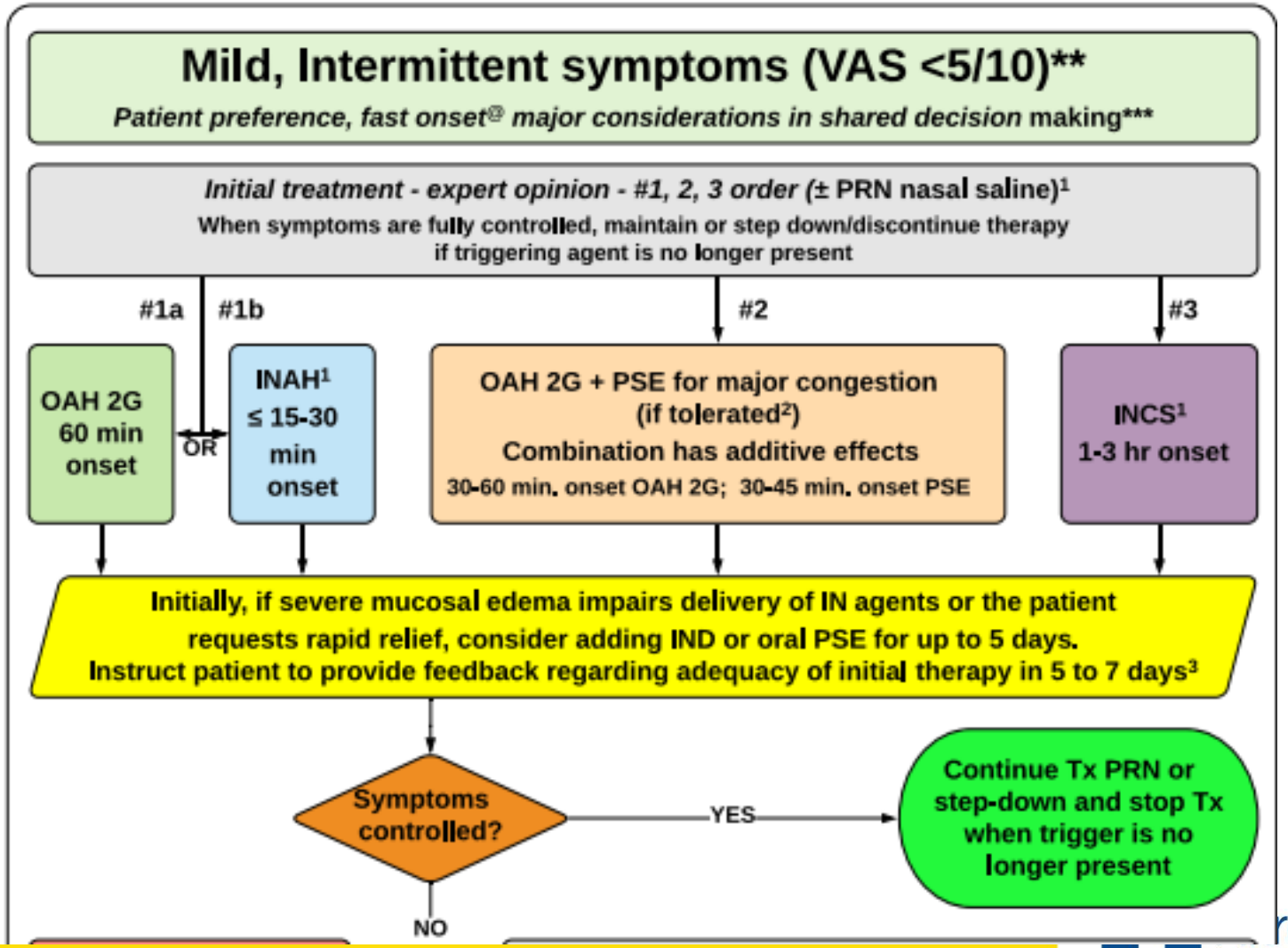
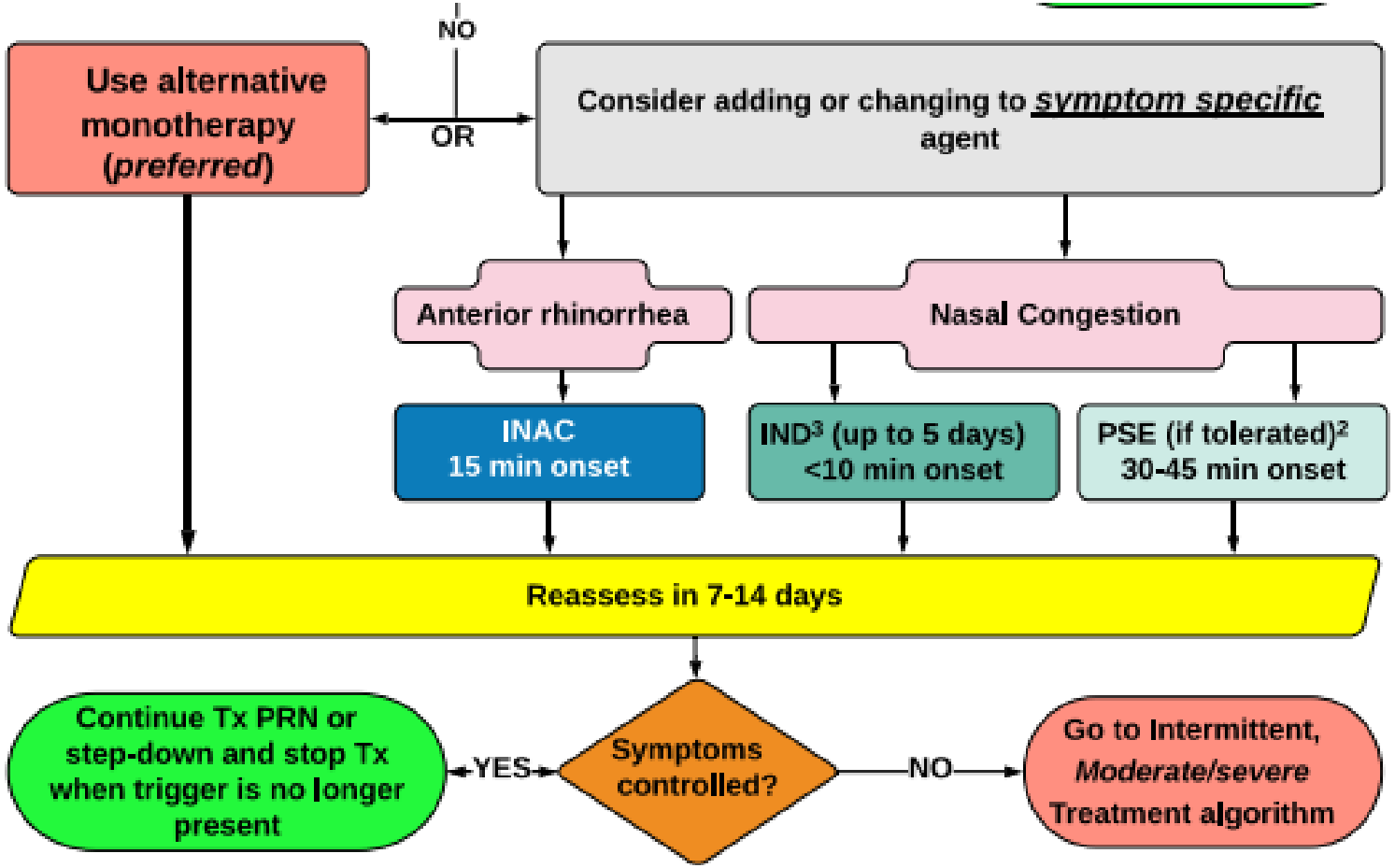
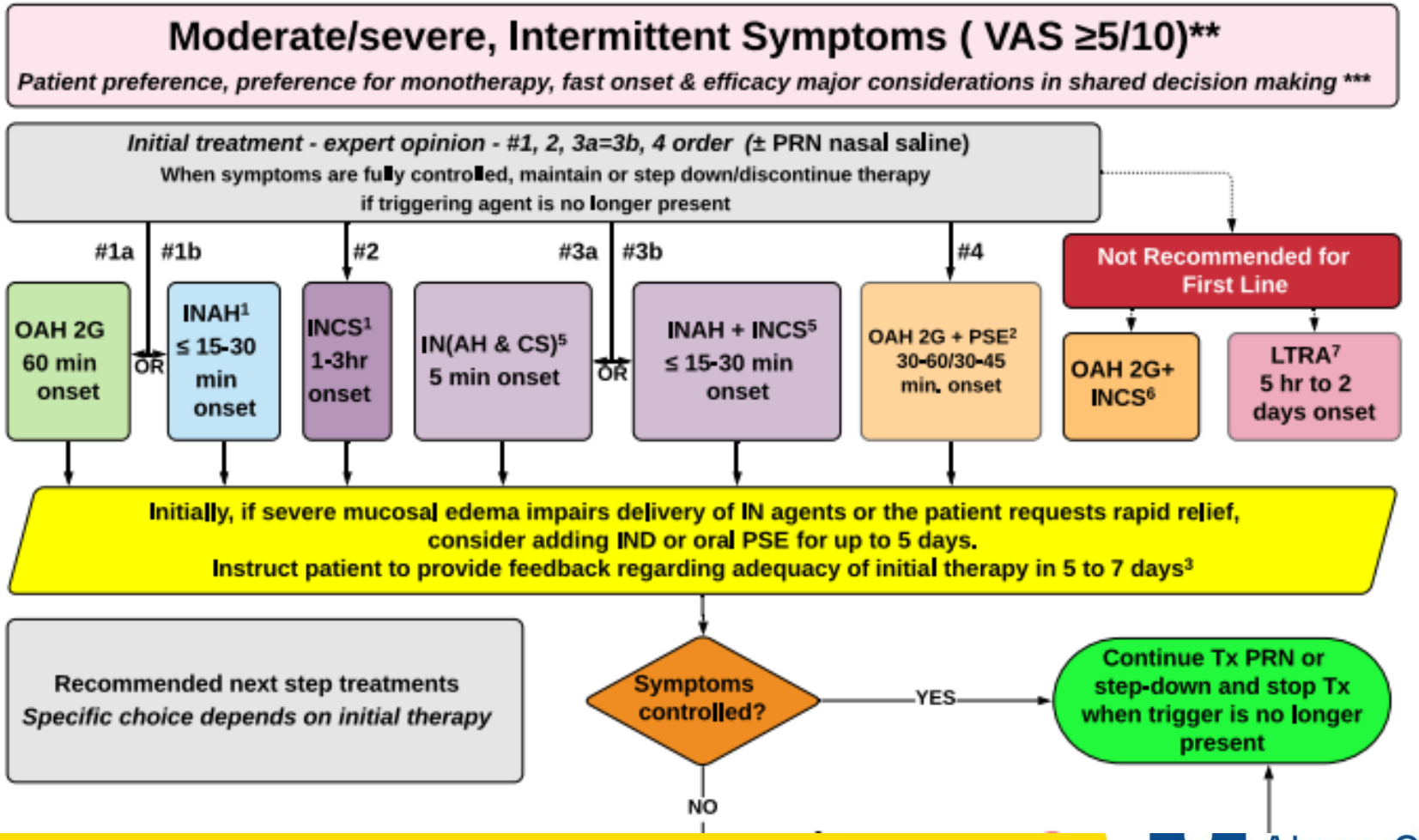
How to Treat- Intermittent Treatment



How to Treat- Intermittent Treatment Failure



How to Treat- Intermittent Rhinitis



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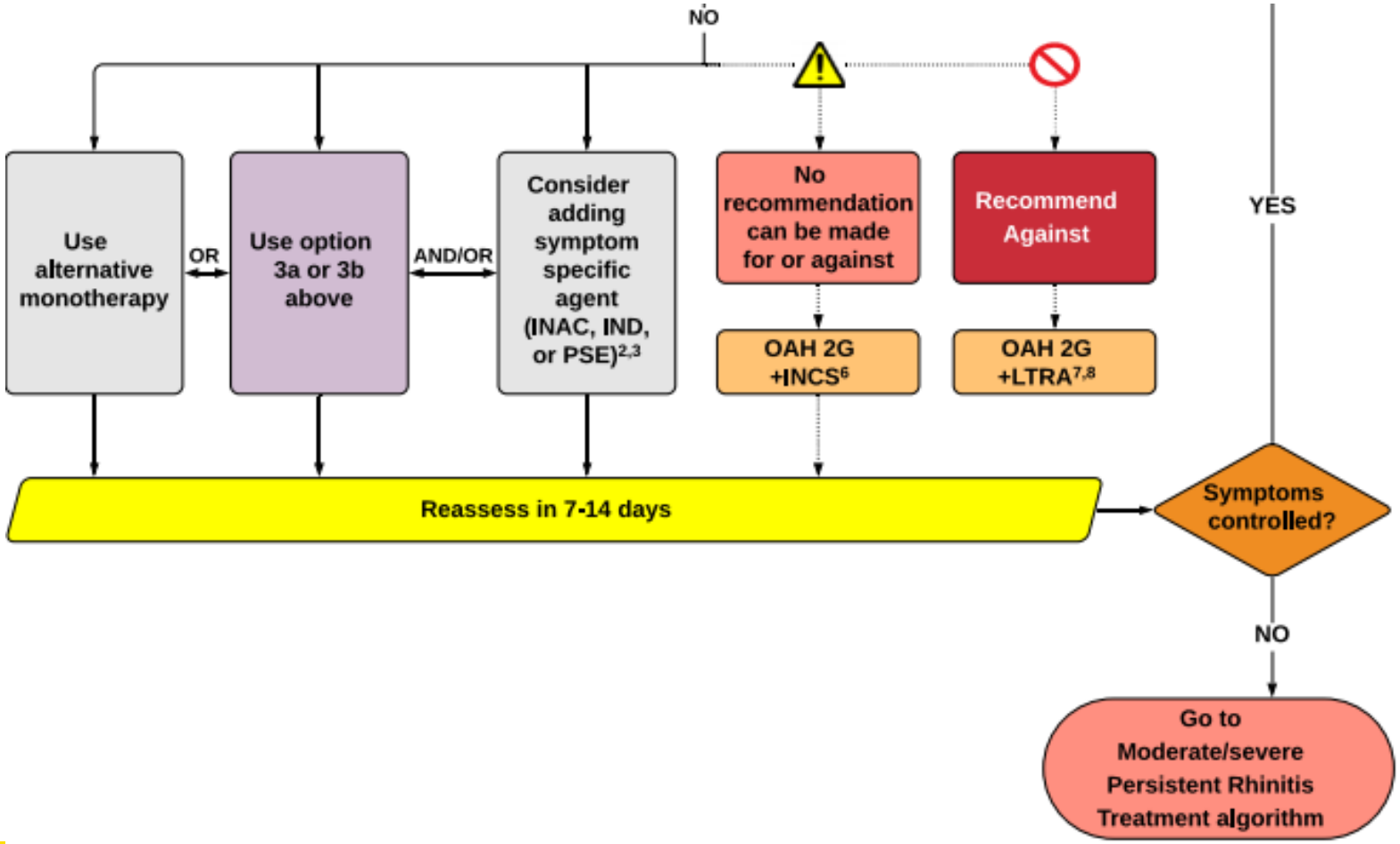
How to Treat- Intermittent Rhinitis Mod/Sev



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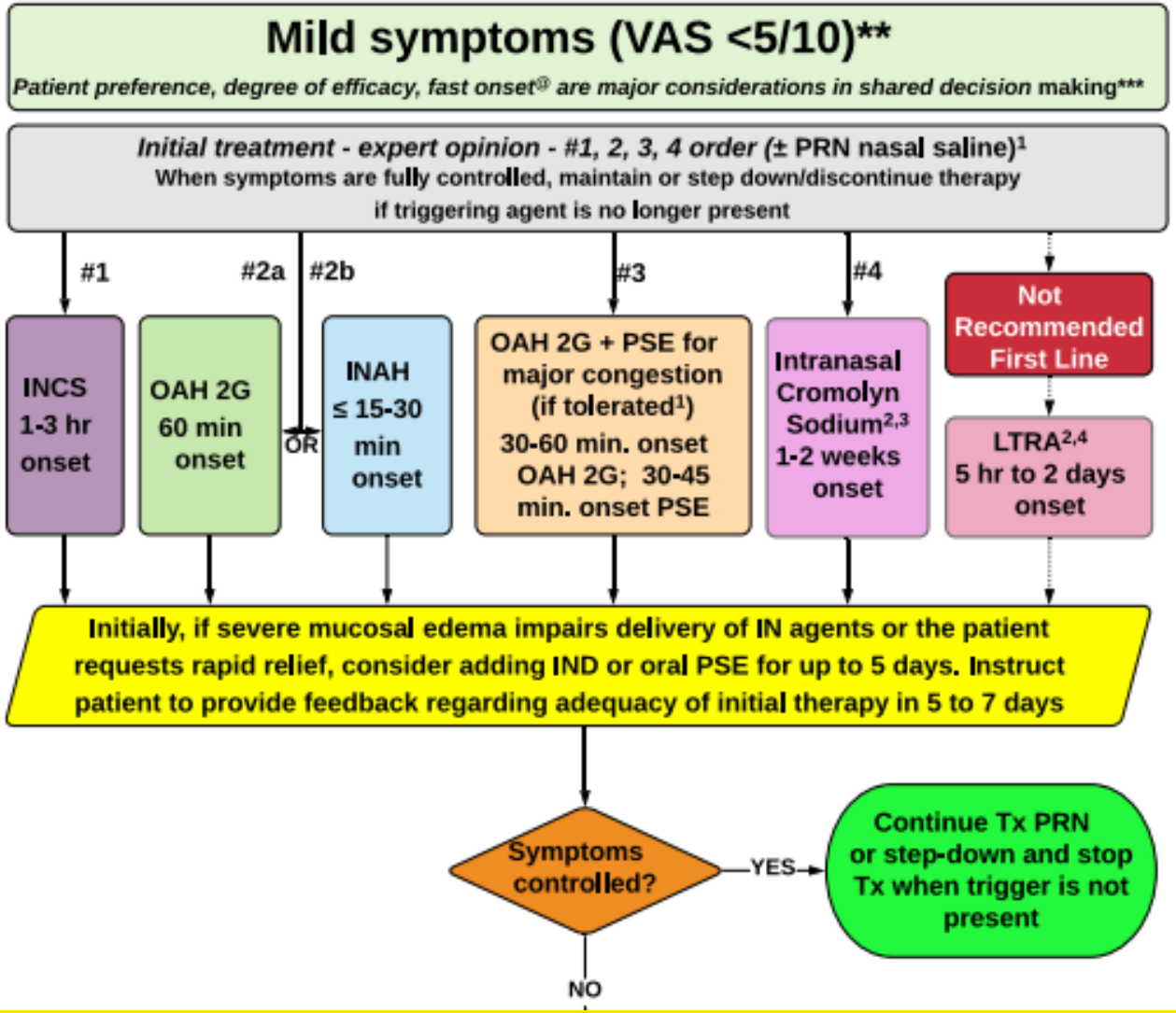
How to Treat- Persistent AR Mild



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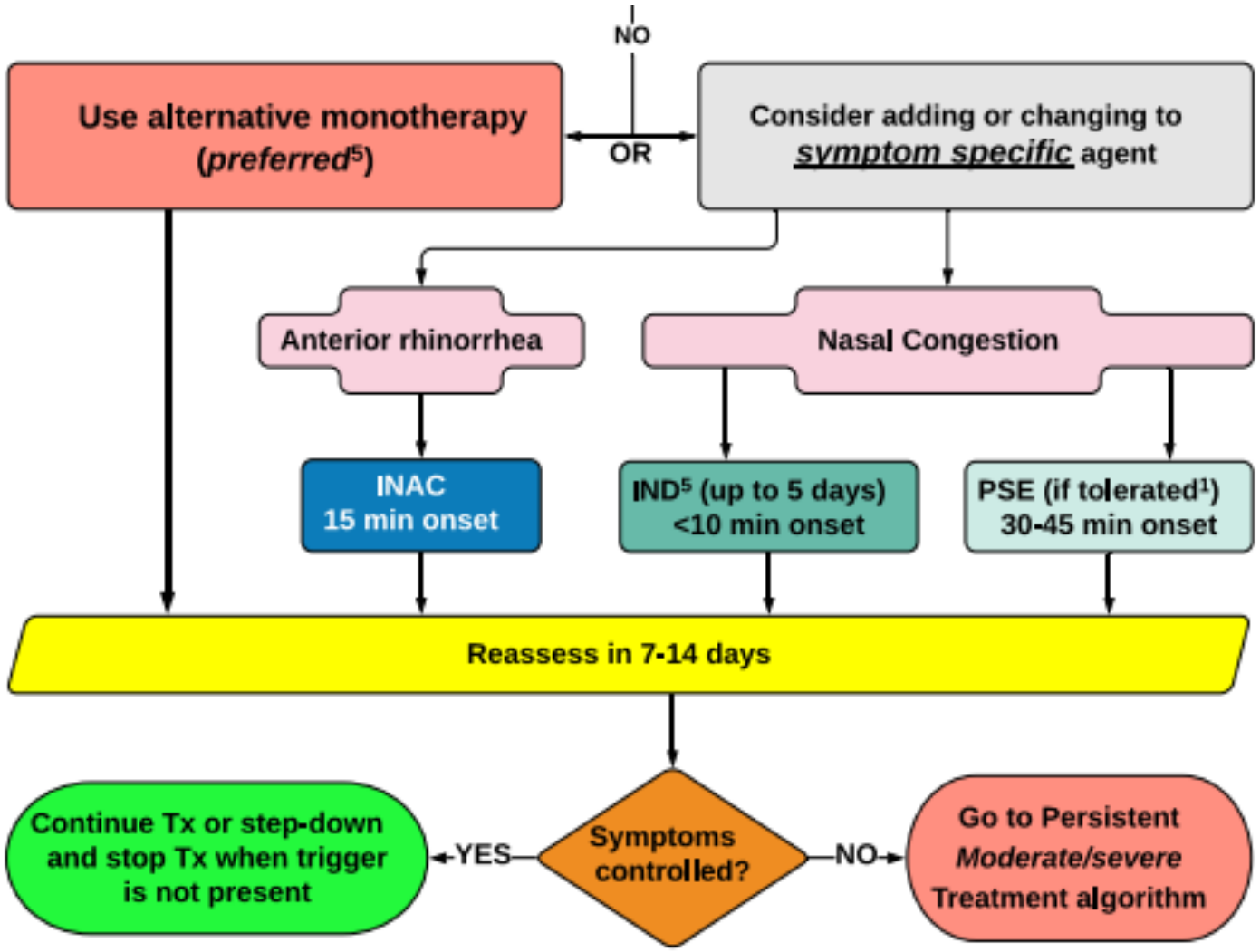
How to Treat- Persistent AR Mild



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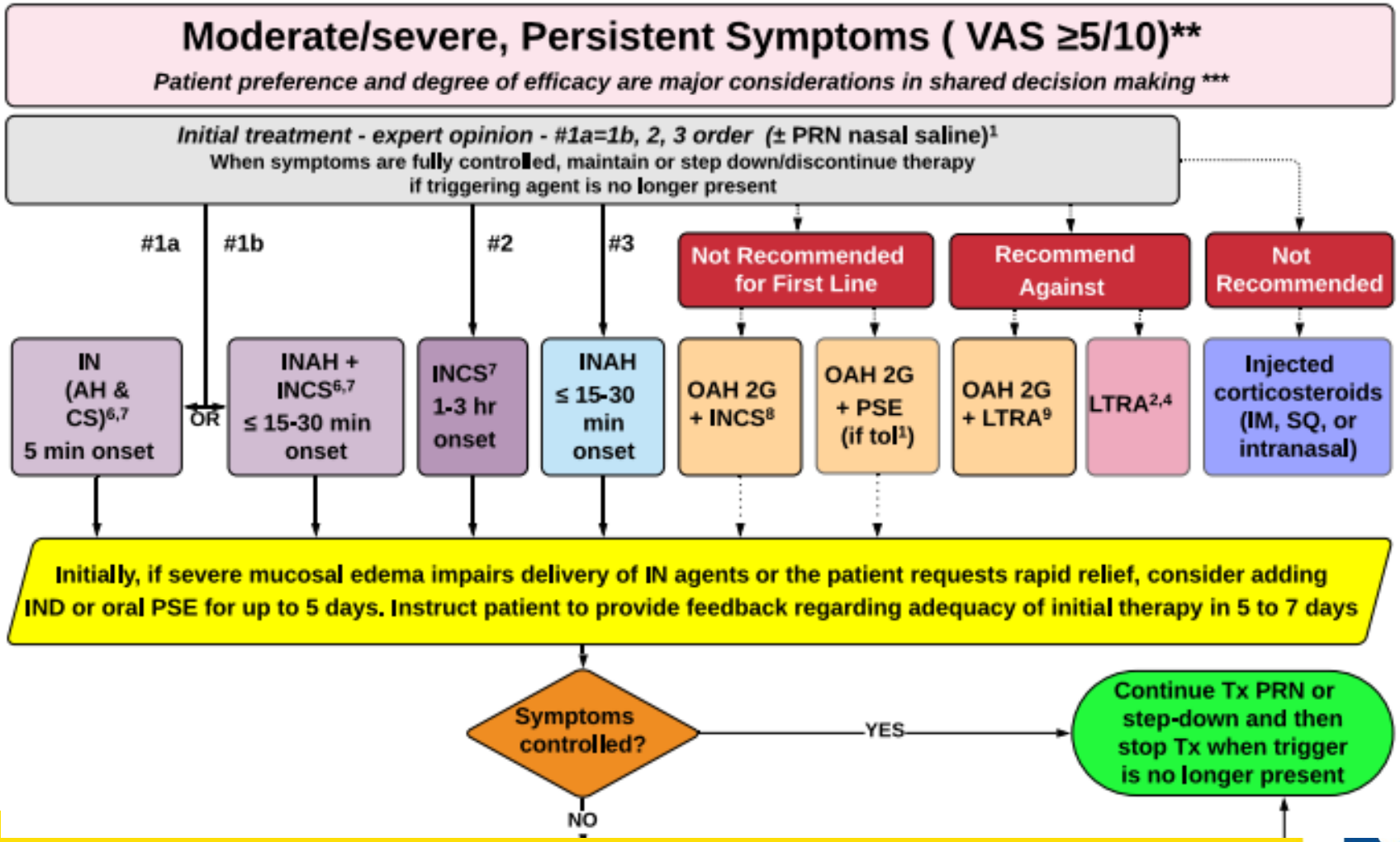
How to Treat- Persistent AR Mod/Severe



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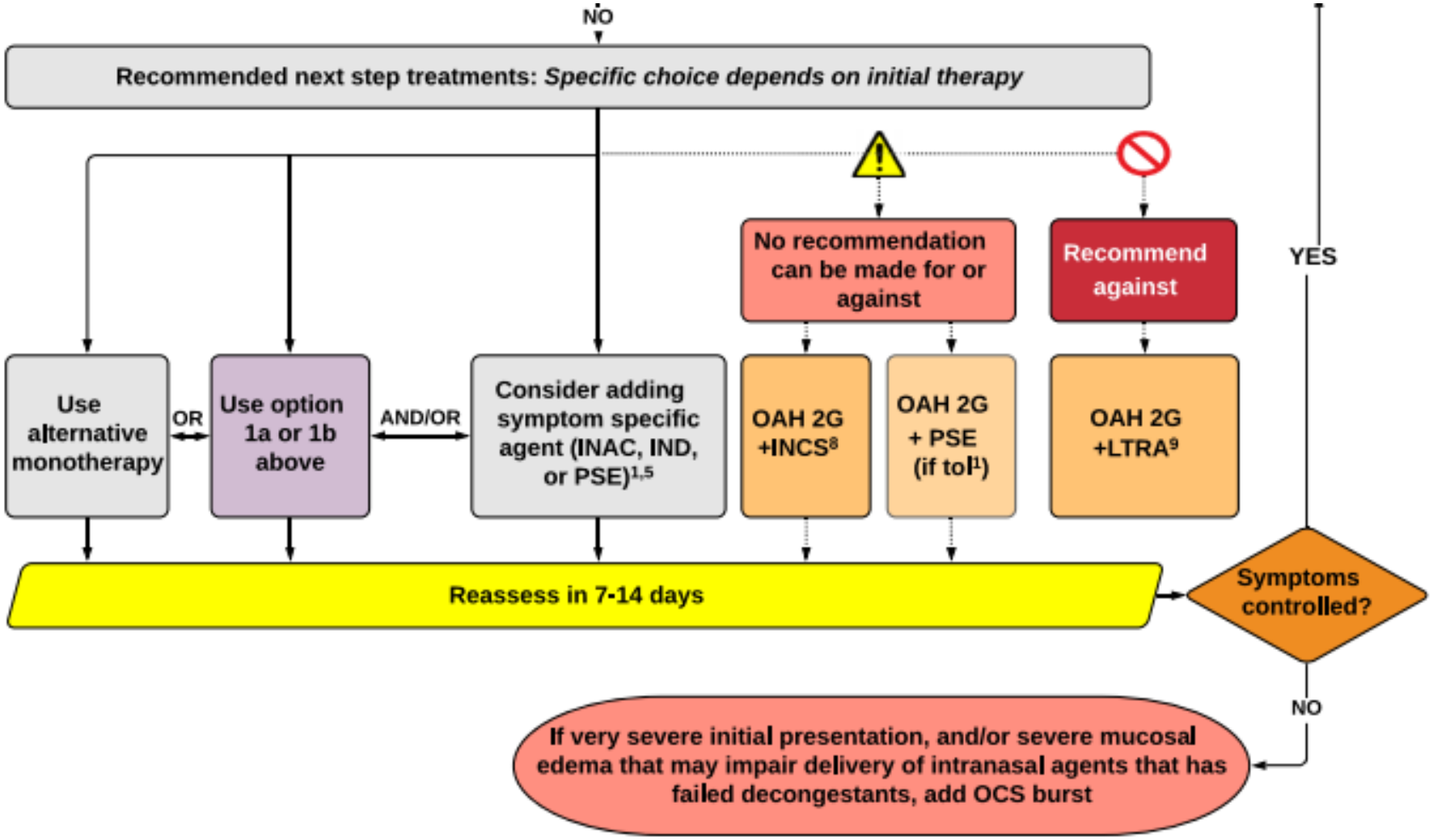
How to Treat- Persistent AR Mild



How to Treat?
Every patient/season is different

- Need to help patients know when to start and when to stop.
- How to treat themselves based on the sypmtoms they are experiencing.
- Patients need to understand when to use daily meds and when to PRN.
- How not to use two medications when one will work.
- HAVE TO DEMONSTRATE TO THEM HOW TO DO THE NOSE SPRAY.

How to treat- 2020 Update New ideas

- Intranasal decongestants and Oral decongestants – pseudoephedrine
- Nasal Sprays are first line treatment. Not antihistamines.
- Intranasal antihistamines are first line treatment for intermittent symptoms.
- Emphasize combinations of meds based on duration, frequency, severity and type of symptoms.

How not to Treat- Practice Parameters

- Try not to use LTRA - Montelukast.
- Switching between loratadine, cetirizine or fexofenadine doesn't help.
- Do not combine oral antihistamines and nasal sprays for AR.
- Cough in a kid with allergies is more likely asthma than post nasal drip.
- Oral 2nd generation antihistamines never help cough.
- First generation antihistamines (diphenhydramine) should be used rarely.
- Do not use primary care allergy shots- Depot Intramuscular steroids.

How to Treat- Onset of Action

TABLE VIII. Onset of action of pharmacological agents for AR

Agent	Study design	Onset of action	Maximal effect	First measure of onset
Intranasal steroid/ antihistamine	EEU	5 min (azelastine/fluticasone propionate)	2 wk or greater	5 min
Intranasal decongestant-oxymetazoline	Peak nasal airflow	<10 min	? within an hour	10 min
INAH	EEU	15 min (azelastine)	1 d to 4 wk	15 min
	EEU	30 min (olopatadine)	1 d to 4 wk	30 min
Intranasal anticholinergic	Methacholine challenge	15 min (ipratropium)	1 h	15 min

How to Treat- Onset of Action

TABLE VIII. Onset of action of pharmacological agents for AR

Agent	Study design	Onset of action	Maximal effect	First measure of onset
Oral antihistamine	EEU	30-90 min (desloratadine)		30 min
	EEU	45 min (levocetirizine)		15 min
	EEU	60 min (cetirizine)	1-8 d	15 min
	EEU	60-75 min (loratadine)	1-8 d	15 min
Oral antihistamine with decongestant	Single-dose park setting	30 min (loratadine/PSE)	Unknown	15 min

How to Treat- Onset of Action

TABLE VIII. Onset of action of pharmacological agents for AR

Agent	Study design	Onset of action	Maximal effect	First measure of onset
INCS	EEU	1-6 h (ciclesonide)	2-4 wk	1 h
	EEU	2.5 h (mometasone)	4 wk	30 min
	EEU	3-8 h (budesonide)	2-4 wk	1 h
	2-wk seasonal study	8 h (fluticasone furoate)	2 wk	30 min
	Not EEU, park study or other	2-12 h (fluticasone propionate)	2-4 wk	2, 4, 12 h (meta-analysis)
LTRA	EEU	Within 5 h (montelukast)	By wk 2	5 h
Intranasal mast cell stabilizer	2-wk seasonal study	2 wk (cromolyn)	At least 2 wk	1 wk
Intranasal mast cell stabilizer before allergen exposure	EEU, nasal allergen challenge	Application 1-7 min before allergen exposure	N/A	≥10 min

How to treat? Nasal steroids (Cadillac)

Source: Wikimedia Commons

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How to treat? Nasal steroids

- Cadillac- Sneezing, itching, dripping, congestion.
- Helps both nose and eye symptoms.
- Some have perfume and are (Goopy)- Fluticasone propionate.
- Pick by cost, tolerance and age indications (>2 y/o).
- Fluticasone furoate (Flonase Sensimist) is best for kids who do not like nose sprays. Not covered by insurance.

How to treat? Nasal antihistamines (Motorcycle)

Source: Wikimedia Commons

Case- Allergic Rhinitis

- Motorcycle- PRN or daily.
- Azelastine 0.1% (137mcg), 0.15% (205.5mcg).
  - >12 years old: 1-2 sprays up to BID.
- Olopatadine- 0.6% (600mcg)
  - >6 years old: 1-2 sprays up to BID.
- Daily or as needed.
- Both taste terrible- you need to sell it.

How to treat?[8] Antihistamines

Source: Wikimedia Commons

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How to treat? Antihistamines

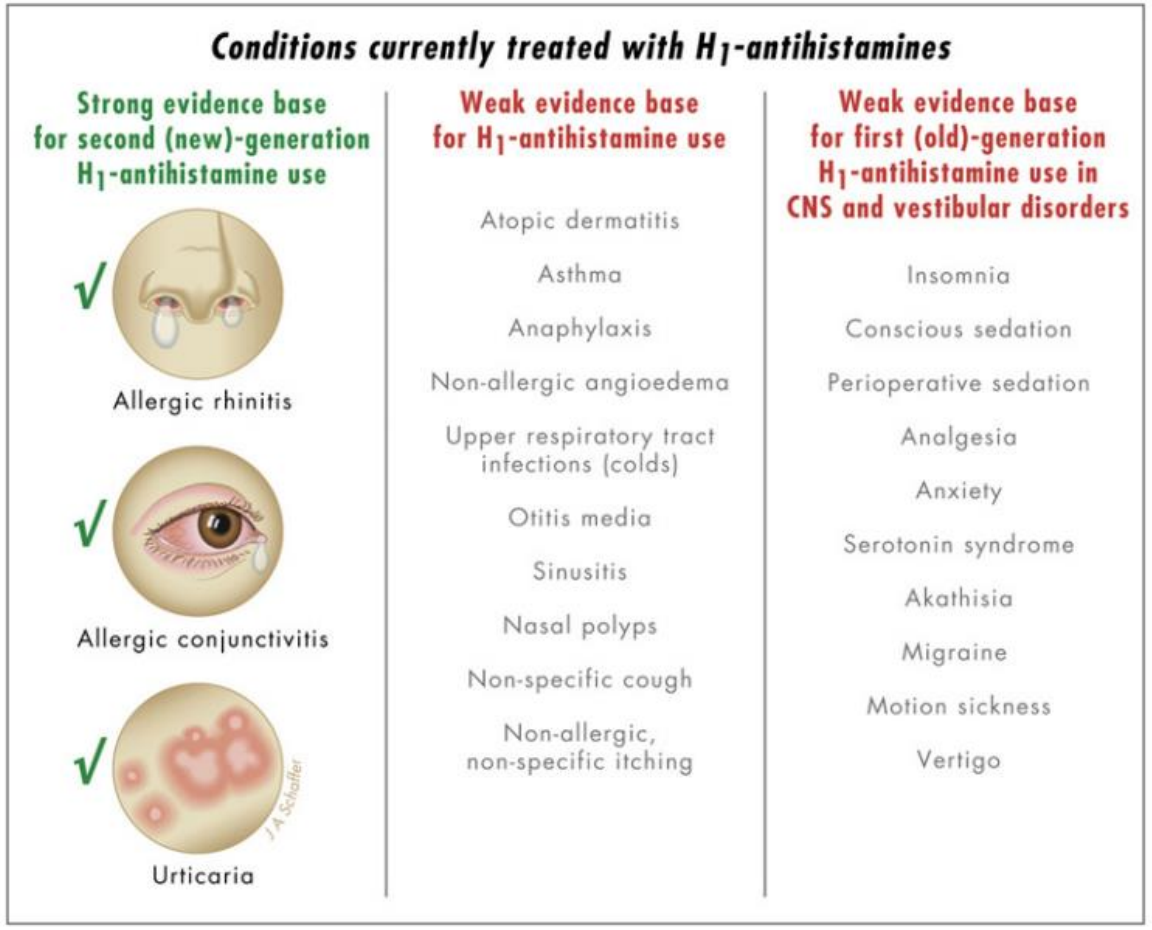
- Bicycles- Second Generation Antihistamines
  - Treat sneezing and itching.
  - Does not help congestion, minimal drainage.
- Use Second generation.
- PRN or Daily- Works better daily

How to treat? Pharmacology

- Antihistamines first synthesized in 1937 by Nobel Prize winner, Daniel Bovet.[2]
- Mechanism of action: Inverse agonist for G-protein-coupled histamine receptors ➔ inhibit smooth muscle constriction and glandular secretions.[1,2]
  - First generation: Poorly selectivity for H_1 receptor, highly lipophilic, crosses blood-brain barrier and can occupy up to 70% CNS-H_1 receptors at standard doses.
  - Second generation (1980s): Increased selectivity for H1 receptor, reduced ability to cross blood-brain barrier due to alteration of chemical structure (addition of a carboxylic moiety) and reduced occupation of CNS-H1 receptors (30% for cetirizine, negligible for fexofenadine).

How to treat- Indications

- Second-generation antihistamines studied and indicated for treatment of allergic rhinitis, allergic conjunctivitis and urticaria.[1]
- Limited efficacy and approval indications for first generation antihistamines.
- Antihistamines not first line therapies for asthma, atopic dermatitis or **anaphylaxis.**



1. Simons FER, Simons KJ. Histamine and H1-antihistamines: Celebrating a century of progress. J Allergy Clin Immunol 2011;1139-50.e4.

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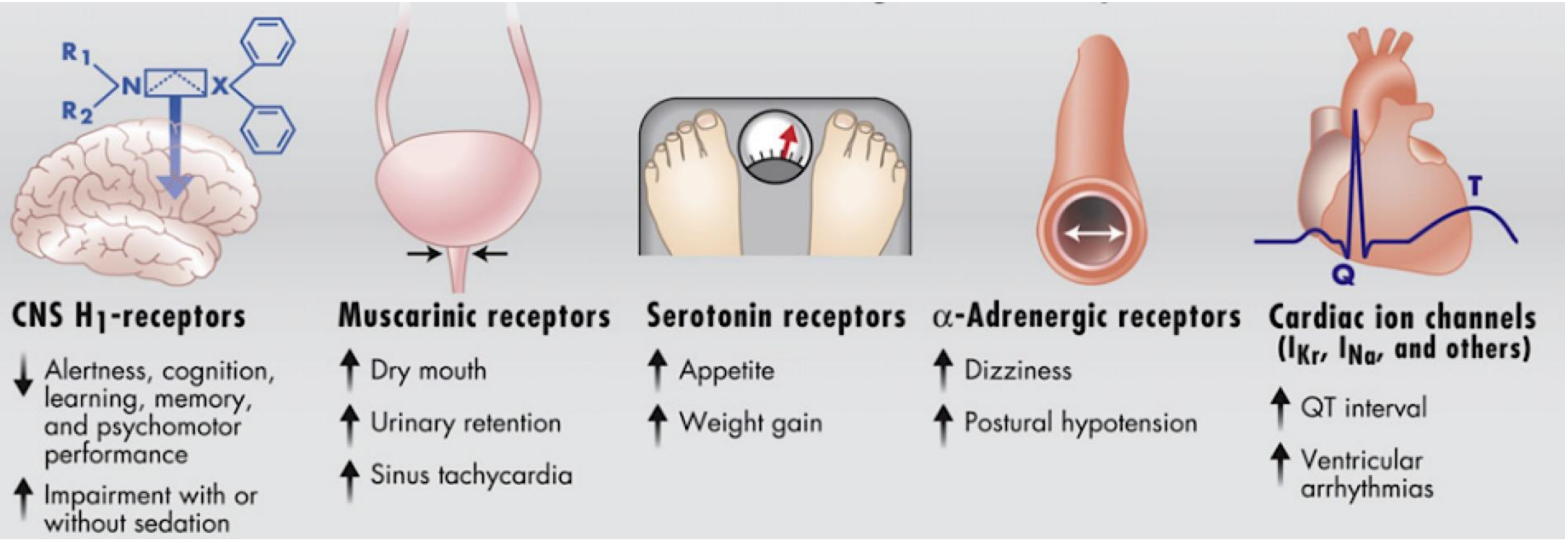
First generation H1-antihistamines side effects

- Interacts with multiple receptors leading to systemic effects



4. Adkinson Jr. FN, Bochner BS, Burks WA, et al. 2013. Middleton's Allergy Principles and Practice. Edition 8. Saunders.

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First Generation H1-Antihistamines

- The dose–response curve for symptom relief is flat. In contrast, the dose–response curve for CNS adverse effects is steep.[5]
- Doubling the dose is unlikely to result in significant additional symptom relief, and *is* likely to increase the risk of adverse effects.
- In some areas, drivers deemed to be at fault for causing traffic fatalities can lose their license, or be fined or imprisoned if they have been taking a first-generation H1-antihistamine.[4]
  - Commercial and military pilots prohibited from use of diphenhydramine before and during flight.
  - Diphenhydramine potentiates sedative effects of alcohol and other sedative agents.

4. Adkinson Jr. FN, Bochner BS, Burks WA, et al. 2013. Middleton's Allergy Principles and Practice. Edition 8. Saunders.
5. Adkinson Jr. FN, Busse WW, Bochner BS, et al. 2008. Middleton's Allergy Principles and Practice. Edition 7. Mosby.

How to treat? AH 2Gen Anticholinergic effects

- No AntiCholinergic Effects-
  - Cetirizine
  - Fexofenadine
- Partial AntiCholinergic effects-
  - Azelastine
  - Olopatadine
- Full AntiCholinergic Effects
  - Loratadine
  - Desloratadine
  - Ketotifen

Cetirizine vs Diphenhydramine

Drug	Cetirizine	Diphenhydramine
Onset of action	15-30 minutes[7-8]	15-60 minutes[7-8]
Efficacy for anaphylaxis	No difference[7-8]	No difference[7-8]
Duration of effect	24 hours	6 hours
Side effects	Sedation (17%) [7]	Sedation (28.7%) [7] Anticholinergic
Age indications (Safety)	FDA approved: ≥6 months	OTC Label: 2 yo[9] Few studies on <6 yo[7]
Use for other conditions	Allergic rhinitis Allergic conjunctivitis Hives Itching	Weak evidence for allergic conditions and/or neurologic disorders

7. Park JH, Godbold JH, Chung D, Sampson HA, Wang J. Comparison of Cetirizine to Diphenhydramine in the Treatment of Acute Food Allergic Reactions. JACI 2011;128:1127-1128.
8. Banerji A, Long AA, Camargo CA Jr. Diphenhydramine versus non-sedating antihistamines for acute allergic reactions: a literature review. Allergy Asthma Proc. 2007; 28(4):418–426.
9. Gelotte CK, Zimmerman BA, Thompson GA. Single-Dose Pharmacokinetic Study of Diphenhydramine HCl in Children and Adolescents. Clin Pharmacologic Drug Dev. 2017;7:400-407.

How to treat? Antihistamines for AR

- **All bicycles-** All equally efficacious
- **Cetirizine-** 13% rate of sedation Cat B Age Based dosing
  - 2.5mg 6 months-2 years old
  - 5mg 2-5 y/o
  - 10mg 6-adult
- **Loratadine** 2.5, 5, 10mg Daily. Cat B
- **Fexofenadine-** 60mg once per day 60mg bid or 180mg Daily Cat C
- **Levocetirizine and desloratadine-** 1.25-5mg:
  - Expensive bicycles- **work as well as cheap bicycles**.

How to treat? LTRA- use only in Asthma

- Bicycle
  - Not more effective than oral antihistamines.
  - Daily.
- Montelukast
  - >1 year old.
  - 4mg (1-5 y/o), 5mg (6-14), 10mg once per day (>15 y/o).

How to Treat? Combination

Source: Wikimedia Commons

How to Treat? Combination

- Oral Antihistamines + oral decongestants- not proven to be better than either alone.
- Oral Antihistamines + LTRA = may be better than each alone but not better than INS
- Oral Antihistamine + INS = No additive benefit over INS alone.
- LTRA + INS = limited if any added benefit.
- INS + INA = better than INS or INA alone. Dymista- Fluticasone propionate + Azelastine has shown increased efficacy when compared to each component alone.

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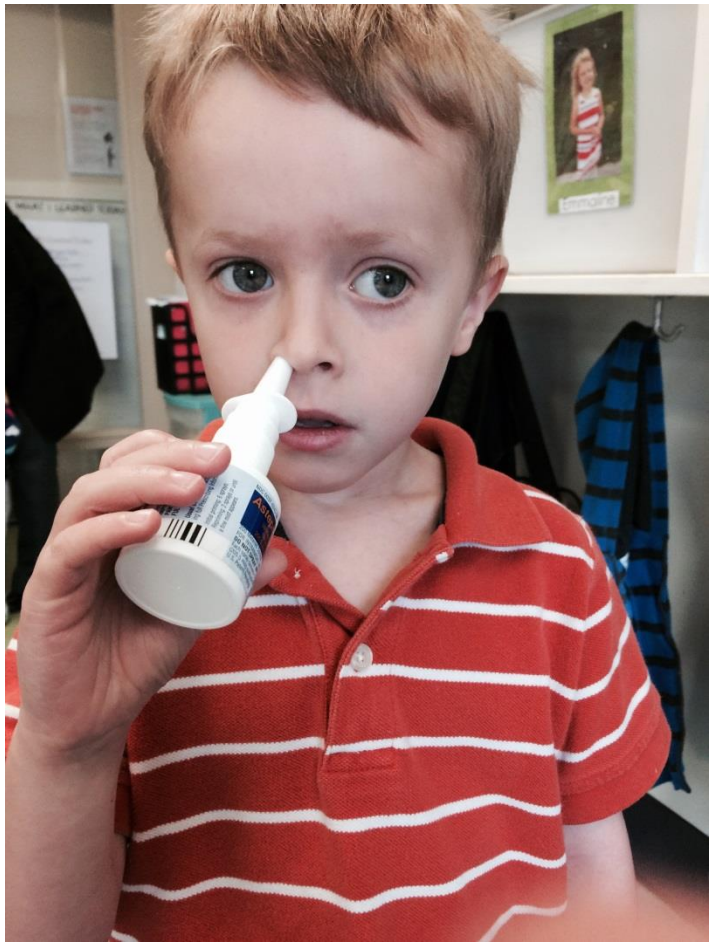

AT NIGHT!

Whenever you feel like it!

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How to treat? Other

Source: Wikimedia Commons

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How to treat? Other

- Oral decongestants- not recommended <4.
  - Okay for congestion and drainage.
  - Recommend prn or short term use.
- Nasal Decongestants- For nose congestion, helps other nose sprays get in.
  - Use for less than <5 days to prevent rebound (Rhinitis medicamentosa).
  - Use along with Nasal Steroids may prevent rebound.
- Ipratropium nasal spray- >5 years old
  - helps for Rhinorrhea only. Nice adjuvant therapy.

How to…make it go away?

Source: Wikimedia Commons

How to…make it go away?[9]

- Immunotherapy- SCIT and SLIT now available.
- Only disease modifying therapy.
- Treats AR, AC, Asthma
- Prolonged benefit after discontinuation.
- Not more expensive in long run.[10,11]

How to make it go away?

SCIT

- Any age- though needles.
- All allergens covered
- Needs frequent visits
- Anaphylaxis- SCIT>SLIT
- May prevent asthma
- May prevent allergic sensitization.

SLIT

- Done at home before and during season.
- Only one allergen
- Grass- 6 and over
- Ragweed- 12 and over.
- Safer

How to make it go away?

SCIT

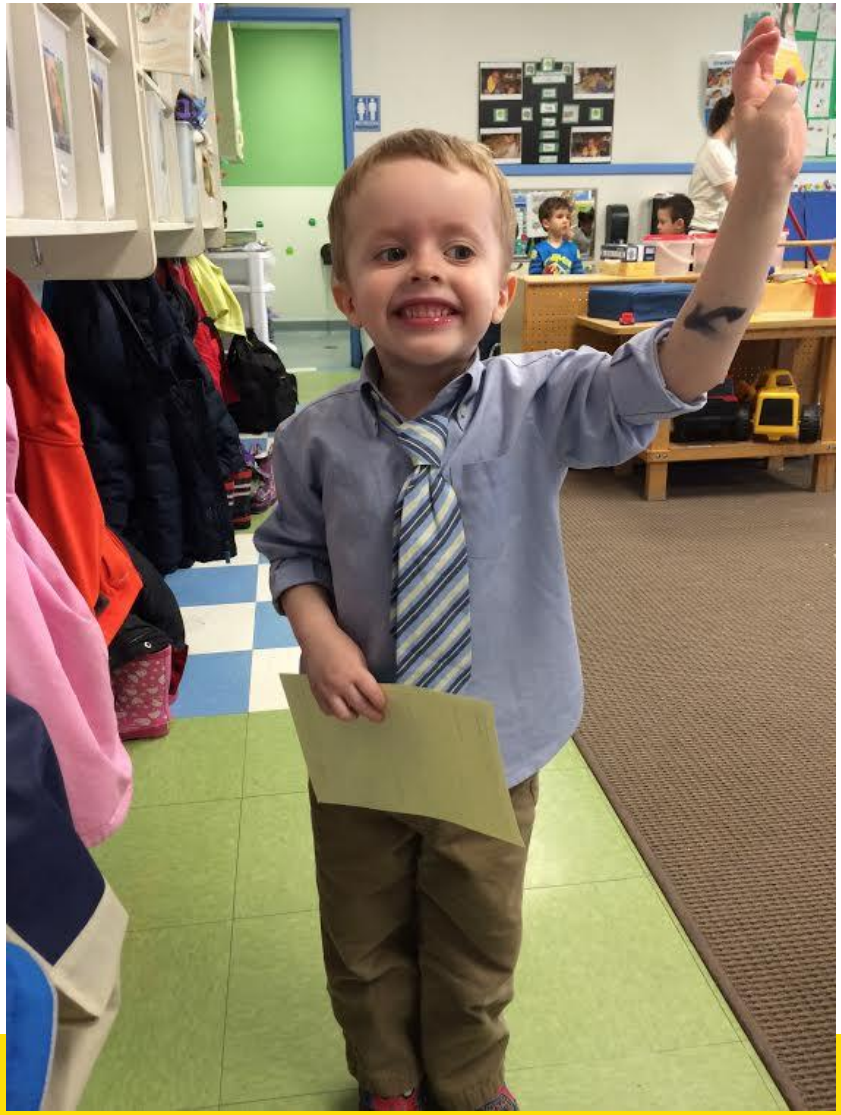
- Any age- though needles.
- All allergens covered
- Needs frequent visits
- Anaphylaxis- SCIT>SLIT
- May prevent asthma
- May prevent allergic sensitization.

SLIT

- Done at home before and during season.
- Only one allergen
- Grass- 6 and over
- Ragweed- 12 and over.
- Safer

FUTURE: ILIT? Intralymphatic Immunotherapy[12]

Questions?



Akron Children's Hospital

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The End!

Case 1

- 17 year old woman who has a cough.
- It has been present for 4 weeks and is associated with post nasal drip.
- The cough is occurring during the day and at night.
- Similar coughing has been present off and on for years but has not been evaluated. This year is the worst.

Case 1- Questions

- Post nasal drip is
  - All day long and clear.
  - Sneezing in the morning and when outside
  - Congestion is present and switches from side to side
- Cough-
  - Trouble falling asleep not waking up from sleep
  - Worse during and after gymnastics
  - Associated with changes in her voice.
- What else?

Case 1-Past Treatment

- She has tried loratadine and an albuterol inhaler with no relief in any symptoms.
- What next?

Case 1- New treatment

- Nasal steroids- What dose? When? How?
- Nasal Antihistamines- What dose? When? How?
- Spirometry?
- Skin Prick testing?
- Avoidance?

Case 1- New treatment

- Nasal steroids- What dose? When? How?
  - Triamcinolone 2 separate sprays once per day at night.
- Nasal Antihistamines- What dose? When? How?
- Spirometry?
- Skin Prick testing?
- Avoidance?

Case 1- New treatment

- Nasal steroids- What dose? When? How?
- Nasal Antihistamines- What dose? When? How?
  - Azelastine 1-2 sprays up to twice per day.
  - Warn about taste and irritation after spraying
  - Show how to use correctly
- Spirometry?
- Skin Prick testing?
- Avoidance?

Case 1- New treatment

- Nasal steroids- What dose? When? How?
- Nasal Antihistamines- What dose? When? How?
- Spirometry?
  - Normal FEV1, Flattening of inspiratory curve, coughing during procedure.
- Skin Prick testing?
- Avoidance?

Case 1- New treatment

- Nasal steroids- What dose? When? How?
- Nasal Antihistamines- What dose? When? How?
- Spirometry?
- Skin Prick testing?
  - Positive to cats, dust mites, oak, birch, timothy grass.
- Avoidance?

Case 1- New treatment

- Nasal steroids- What dose? When? How?
- Nasal Antihistamines- What dose? When? How?
- Spirometry?
- Skin Prick testing?
- Avoidance?
  - Talk about the cat- Mom says that the cat is staying.
  - Dust mite covers
  - Close windows, HEPA filter
  - Showers after being outside

Case 1- Follow up

- Return in July- nose sneezing, dripping and congestion much improved but not gone.
- Cough remains.
- Further history- cough triggers include perfumes, smoke, gymastics
- Refer to ENT for laryngoscopy to evaluate for vocal cord dysfunction.
- Recommend relaxed throat breathing/speech therapy

Case 2

- 2.5 y/o boy with history of moderate eczema comes for chronic cough and rhinitis.
- Constant clear mucous with occasions of thick discolored mucous which is year round.
- Cough is during day and at night and occurs for 2-3 weeks at a time 7-8 times per year.
- RSV diagnosed in March with confirmatory testing.

Case 2

- Is currently on antibiotics from UC for OME and loratadine daily
- Has had AOM 5-6 times in last year.
- His eczema is well controlled.
- Started daycare at 3 months old
- Normal HT, WT, UTD on immunizations.
- What else?
- He snores even between colds.

Case 2

- Seen in ENT Clinic- found to have enlarged adenoids- scheduled for TM tubes and adenoidectomy.
- 2 months post- continued rhinitis and cough symptoms, snoring is gone.
- Local ENT suggested CT scan of sinuses as next step
- Allergy evaluation- has 2 dogs at home. Worse symptoms this spring. Also had peanut reaction.
- What now?